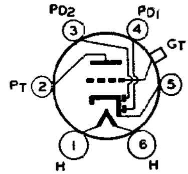


RCA-85

DUPLEX-DIODE TRIODE



The 85 is a heater type of tube consisting of two diodes and a triode in a single bulb. It is for use as a combined detector, amplifier, and automatic-volume-control tube in radio receivers designed for its characteristics. The two diodes and the triode are independent of each other except for a common cathode sleeve, which has one emitting surface for the diodes and another for the triode. The separate tube units permit of unusual flexibility in circuit arrangement and design. For example, the diodes of this tube can perform the functions of detection and of automatic volume-control; while, at the same time, the triode may be used as an amplifier under its own optimum conditions. For diode-detector considerations, refer to page 26.

CHARACTERISTICS

Heater Voltage (A. C. or D. C.)	6.3	Volts
Heater Current	0.3	Ampere
Grid-Plate Capacitance	1.5	μμf
Grid-Cathode Capacitance	1.5	μμf
Plate-Cathode Capacitance	4.3	μμf
Bulb		ST-12
Cap		Small Metal
Base		Small 6-Pin

Triode Unit—As Class A Amplifier

Plate Voltage	135	180	250 *max.*	Volts
Grid Voltage	–10.5	–13.5	–20	Volts
Amplification Factor	8.3	8.3	8.3	
Plate Resistance	11000	8500	7500	Ohms
Transconductance	750	975	1100	Micromhos
Plate Current	3.7	6.0	8.0	Milliamperes
Load Resistance	25000	20000	20000	Ohms
Power Output	0.075	0.16	0.35	Watt

Diode Units

The two diode plates are placed around a cathode, the sleeve of which is common to the triode unit. Each diode plate has its own base pin. Operation curves for the diode units are given under type 6B7.

INSTALLATION

The base pins of the 85 fit the standard six-contact socket, which may be installed to hold the tube in any position. For heater operation and cathode connection, refer to INSTALLATION under type 6A8. Complete shielding of detector circuits employing the 85 is generally necessary to prevent r-f or i-f coupling between the diode circuits and the circuits of other stages.

APPLICATION

The 85 is recommended for performing the simultaneous functions of automatic volume-control, detection, and amplification.

For **detection,** the diodes may be utilized in a full-wave circuit or in a half-wave circuit. In the latter case, one plate only, or the two plates in parallel, may be employed. The use of the half-wave arrangement will provide approximately twice the rectified voltage as compared with the full-wave arrangement.

For **automatic volume-control,** a rectified voltage which is dependent on the r-f or i-f carrier, is usually employed. This voltage is utilized to regulate the gain of the r-f and/or i-f amplifier stages so as to maintain essentially constant-carrier input to the audio detector. The regulation of amplifier gain by means of the rectified voltage may be accomplished by a number of methods, differing chiefly in

the means of applying the voltage to the various electrodes of the amplifier tubes. As is well known, the regulating voltage may be applied to the control grids of the amplifier tubes. On the other hand, by less familiar methods, the voltage may, depending on the requirements of the designer, be applied to other electrodes. For example, the voltage may be applied to suppressor, plate and/or screen of an r-f pentode.

The complex structure of the 85 permits of obtaining automatic-volume-control voltage in a number of ways. In one case, the required voltage is obtained from the detector circuit by utilizing the voltage drop caused by the rectified current flowing through a resistor in the detector circuit. In another case, the required voltage is obtained by utilizing one diode for the sole purpose of automatic volume-control (a.v.c.). This latter method is of particular interest since it confines the sensitivity and time-delay function to the a.v.c. circuit. Time-delay action is, of course, determined by the use of a resistance and condenser combination having the desired time constant. The a.v.c. action may be postponed by applying a negative voltage to the a.v.c. diode plate. Another a.v.c. arrangement capable of various adaptations is to use the triode as a d-c amplifier to supply the regulating voltage. Additional information on automatic volume-control is given on page 28.

For **amplification**, the triode may be employed in conventional circuit arrangements. Representative conditions for resistance-coupled amplifier applications are given in the Resistance-Coupled Amplifier Section. Grid bias for the triode, depending upon circuit design, may be obtained from a fixed-voltage tap on the d-c power supply or may be obtained by utilizing the variable voltage drop caused by the rectified current flowing through a resistor in the detector circuit. In this connection, it should be noted that the circuits shown below designate this latter arrangement as "Diode-Biased Amplifier." Diode biasing of the triode unit may be employed only when at least 20000 ohms resistance is used in the triode plate circuit.

A plate family of characteristics for the triode unit is given under type 55.

TYPICAL DUPLEX-DIODE TRIODE CIRCUITS

HALF-WAVE DETECTOR
DIODE BIASED AMPLIFIER

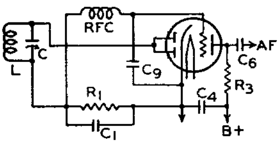


FIG. 1

FULL-WAVE DETECTOR
DIODE BIASED AMPLIFIER

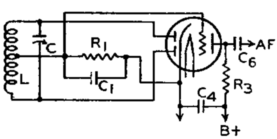
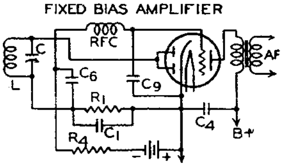


FIG. 2

HALF-WAVE DETECTOR
FIXED BIAS AMPLIFIER



HALF-WAVE DETECTOR
DIODE BIASED D-C AMPLIFIER

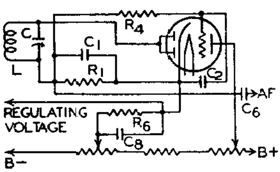


FIG. 4

HALF-WAVE DETECTOR
FIXED BIAS AMPLIFIER

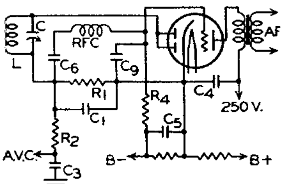


FIG. 5

HALF-WAVE DETECTOR, SEPARATE
A.V.C., FIXED BIAS AMPLIFIER

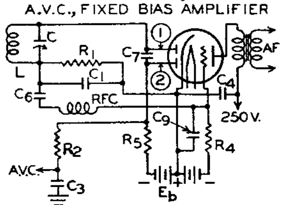


FIG. 6

APPROXIMATE VALUES

C_1 = 150 μμf FOR 500–1500 KC.; 450 μμf FOR 175 KC.	C_9 = 0.0001 μf OR SMALLER
C_2 = 0.1 μf	R_1 = 0.5–1.0 MEGOHM
C_3 = 0.1 μf	R_2 = 1.0–1.5 MEGOHMS
C_4 = 0.5 μf OR LARGER	R_3 = 0.1 MEGOHM
C_5 = 0.5 μf OR LARGER	R_4 = 0.5–1.0 MEGOHM
C_6 = 0.01–0.1 μf	R_5 = 1.0 MEGOHM
C_7 = 0.0005–0.001 μf	R_6 = 25000–75000 OHMS
C_8 = 0.1 μf OR LARGER	E_b = VOLTAGE FOR SENSITIVITY CONTROL